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NEWSLETTER OF THE NORTH CENTRAL SECTION
INSTITUTE OF TRANSPORTATION ENGINEERS
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Cortney Falero
Newsletter Editor

Roundabout Modeling Software Comparison

Kelsey Retherford, PE | Bolton & Menk Inc.
Sudheer Dhulipala, PE, PTOE | WSB
Mike Kondziolka, PE, PTOE | Alliant Engineering

In each issue, the INCITER features an article coordinated by one of NCITE's technical committees. This article is a contribution from the **Simulation and Capacity Committee**.

With several software tools currently available to analyze traffic operations, the NCITE Simulation and Capacity Analysis Committee members decided to test how different tools compare with each other on the analysis of a roundabout. The comparison matched the assumptions as closely as possible for all the tools to see what differences are generated in the outputs. A comparison like this could provide some insight into the variability of results based on the tool chosen and could also reveal any inherent issues with the software tools when analyzing roundabouts. This comparison was not completed at the level of a rigorous research project, but rather a basic comparison of commonly used analysis tools for informational purposes.

The tools chosen for this comparison were HCS7, ARCADY, Vissim, and Synchro/SimTraffic. Other tools such as TransModeler and RODEL could be compared in the future to understand whether they lead to significantly different results.

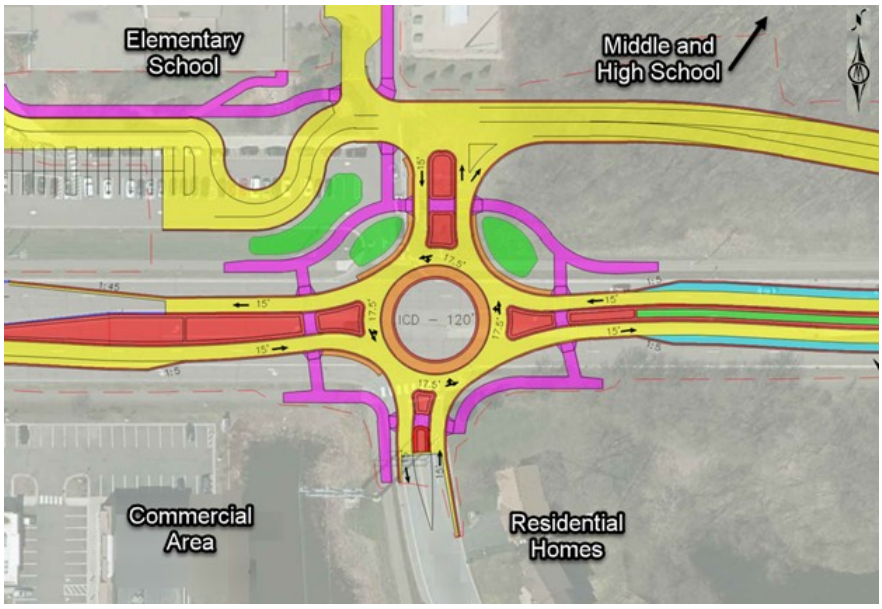

Figure 1 Roundabout Geometry

(Continued on page 8)

JOB OPENINGS

Visit the NCITE website for current job openings | nc-ite.org

EXECUTIVE COMITTEE

President	**Kevin Peterson**, Washington County 651.430.4330 Kevin.Peterson@co.washington.mn.us
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Emerging Technologies	**Position Open**
Complete Streets and Safety	**Hannah Johnson,** Alliant Engineering 612.758.3080 hjohnson@nc-ite.org
Planning Methods and Applications	**Krista Anderson**, SRF Consulting Group 763.452.4804 kanderson@srfconsulting.com
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Simulation and Capacity Analysis	**Sudheer Dhulipala,** WSB 763.762.2839 SDhulipala@wsbeng.com

STANDING COMITTEES

Young Member Committee	**Jack Olsson,** Kimley Horn 651.393.6158 Jack.Olsson@kimley-horn.com
	Cameron Valuch, Alliant Engineering, Inc. 612.428.7044 cvaluch@alliant-inc.com
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North Dakota State University	**Hizb Ullah Sajid**, President lhizbullah.sajid@ndsu.edu
University of Minnesota— Duluth	**Jason Miller**, President dtsoduluth@gmail.com

MIDWESTERN ITE

Midwestern ITE District Director	**Kristi Sebastian**, Dakota County 952.891.7178 kristi.sebastian@co.dakota.mn.us
Midwestern ITE District NCITE Officer	**Jeff Preston**, Stantec 651.604.4816 Jeff.Preston@stantec.com

PRESIDENT'S MESSAGE

Kevin Peterson, *2021 NCITE President*

Kevin Peterson
President

Summer is here! Congratulations to all of the NCITE members who continue to remain flexible and engaged as the Covid-19 pandemic is hopefully winding down. Your NCITE Board and Committees have been very busy this spring so I want to start by thanking the Board and Committee Chairs for continuing to provide such a valuable service to members. Your hard work is important and appreciated!

Looking back; the February NCITE Section Meeting was a presentation on the Fargo Main Avenue Project, March was a 'Virtual Road Show' to Sturgis South Dakota where Liz Wunderlich presented on their trail planning and implementation. The April Section Meeting involved a presentation on the Metro Transit D-Line, The May Section Meeting featured MnDOT discussing Transportation Equity. A special thank you to our speakers for sharing their knowledge and time with us!

The opportunities don't stop there, several exciting events are planned for the next few months, highlights include:

- The Intersection Traffic Control Committee continues to meet monthly, their May Meeting will focus on Flashing Yellow Arrows, and POOFYA Logic.
- The Younger Member Committee continues to hold events every other month, don't forget to join their mailing list!
- The Simulation and Capacity Analysis Committee is also planning for a May Meeting. Joe DeVore will be presenting on Iteris ClearGuide.
- 2021 NCITE Summer Social is tentatively planned for August 4 at the Walker Skyline Mini Golf Course (in person!).
- Great Lakes District 2021 Annual Meeting August 29-31, Columbus Ohio. The deadline to submit abstracts has been extended!

I want to close this President's Message by taking some time to discuss the role of NCITE in Diversity, Equity, and Inclusion. ITE International has made this a focus for the year and has hosted several listening sessions that I hope you are seeking out. As a professional organization, NCITE provides me with a sense of belonging and community. I feel strongly that NCITE delivers a place where Diversity (multiple identities and perspectives), Inclusion (all individuals are welcomed, respected, heard, supported, and valued), and Equity (a commitment to justice, impartiality, and fairness) are fostered, but we can do better. The NCITE Board has begun focusing on Diversity, Equity, and Inclusion, but we need your help. If you are interested in this topic, or just want to share your experiences (good or bad), please reach out to me or anyone on the board we'd love to hear your thoughts or suggestions. I'd also encourage you to visit the ITE Diversity and Inclusion page and browse the NEW Diversity, Equity, and Inclusion Corner in this edition of the INCITER.

Thank you!

UPCOMING EVENTS

ite Calendar

ITE Calendar for District, Section, & Chapter Meetings

Stay Connected with Virtual Events
Online | Dates Vary

ncite

Attend an Upcoming NCITE Technical Committee Meeting! Check out upcoming topics here.

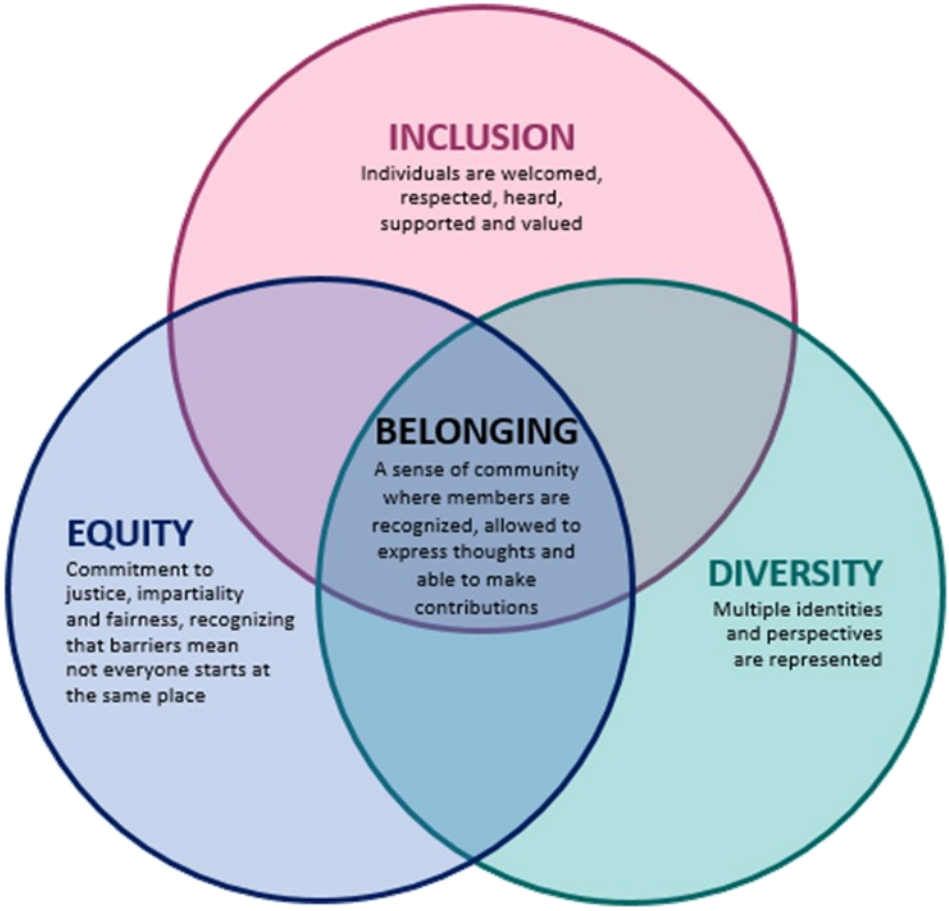
For more information on the committees and how you can get involved:
https://nc-ite.org/Committee_Listing

For professional development opportunities:
http://nc-ite.org/content.php?page=Professional_Development_Meetings

DIVERSITY, EQUITY, AND INCLUSION CORNER

Welcome to the NEW Diversity, Equity, and Inclusion Corner of the INCITER. This will be a space for us all to discuss and learn how our role as transportation professionals is changing. As an introduction to this topic please see the below graphic on how these important items work together.

By nature, this is a topic that cannot be tackled alone so we need your help. If you are interested in sharing your thoughts please contact anyone on the NCITE Board.



A Community of Transportation Professionals

- Diversity is the representation of multiple identities and perspectives.
- Inclusion means that all individuals are welcomed, respected, heard, supported and valued.
- Equity is a commitment to justice, impartiality and fairness, recognizing that privilege and societal barriers mean not everyone starts from the same place.
- Belonging is a sense of community where members are recognized, allowed to express their thoughts, and able to make contributions.

EMERGING TECHNOLOGIES COMMITTEE

COMMITTEE UPDATE!

To better reflect the needs of our members, NCITE is announcing the **Emerging Technologies in Transportation** Committee (Formerly the ITS Committee). But this change isn't just a name rebrand, the committee is now opened up to all types of technologies that advance transportation as we know it. In addition to including Intelligent Transportation Systems, topics that may fall under this new committee now include SmartCities, big data methods in transportation, Automated Traffic Signal Performance Measures (ATSPM's), dynamic congestion solutions (reversible lanes, HOT/HOV lanes, etc), transportation applications and their impacts (such as Waze, ride-share, or scooter apps), Mobility as a Service (Maas), TSMO Needs, automated vehicles and their infrastructure, and more. We're broadening the focus of the committee to include some of the innovative new ideas that are becoming part of the conversation today.

Now that we've made that announcement, we need your help. We already have some awesome ideas for local meeting topics and possible presentations, but NCITE needs someone to help run the committee. The Board will help this person startup and maintain the committee in the first year or so, and even help out as much as needed in giving ideas or logistics coordination, but a solution aimed at maintaining the activity on a longer term basis is needed. We're looking for a committee chair, and depending on interest and activity in the committee, succession and rotations of interested leadership can be determined moving forward. This chair doesn't need to work directly within the field of technology, app-building, or big data – the only requirement is that they're interested in upcoming ideas that can further push transportation into the future. We also picture there being a large potential for joint meetings with other committees due to the collaborative nature of this realm. This open chair position is an ideal spot for a young transportation professional to get involved and meet people in the industry through NCITE, although all are welcome to lead this new committee. If you know someone who may be interested, or are even interested yourself, please let **Tyler Krage** or **Kevin Peterson** know.

We are excited to hear from you, and are especially excited to build upon NCITE's current opportunities to advance the transportation industry!

Image Source: US DOT

YMC UPDATE

In February, the YMC was finally able to connect in-person at our ice skating event at The Oval in Roseville – the largest refrigerated outdoor rink in the world! We also had a chance to get together virtually in April for a joint happy hour with the ITE student chapter at the University of Minnesota. Our next event will be the annual Bike and Brewery event, which will be held in June. Hope to see you there!

If you would like to be added to the YMC email list, or know of any new hires/coworkers that would enjoy our events, please send email addresses to
Jack Olsson (Jack.Olsson@kimley-horn.com) or **Cameron Valuch (cvaluch@alliant-inc.com)**

Roundabout Modeling Software Comparison (continued from page 1)

The location and roundabout geometry chosen for the analysis are shown in **Figure 1**. The proposed roundabout is located adjacent to schools to the north, a residential neighborhood to the southeast, and a commercial area to the southwest. The major roadway, which runs east-west, carries approximately 13,000 vehicles per day. The south leg of the intersection serves approximately 1,500 vehicles per day. The north leg of the intersection serves multiple schools and therefore manages large amounts of traffic in the mornings and afternoons with student drop-offs and pick-ups.

Inputs/Outputs

Input parameters accepted by each program and the given outputs by each are shown below in **Table 1**. Vehicle speeds, conflict areas, and priority rules are listed as "Other Factors" for Vissim. In Vissim you can adjust these features when calibrating the model. The model should be calibrated to the correct capacity based on the equations in the Highway Capacity Manual (6th Edition).

Table 1: Inputs and Outputs by Program

	Modeling Features	**Vissim**	**HCS7**	**ARCADY**	**Synchro** (HCM 6th Edition)	**SimTraffic**
INPUTS	***Volumes***	15 min volumes	60 min volumes PHF by intersection	15 min volumes	60 min volumes PHF by intersection	15 min volumes
	Heavy Commercial	By approach	By movement	By movement	By movement	By movement
	Geometric Considerations	Number of lanes	Number of lanes	Number of lanes, entry width, effective flare length, half width, entry radius, entry angle, inscribed diameter	Number of lanes	Number of lanes
	Simulation	Yes	No	Yes	No	Yes
	Other factors	Vehicle Speeds, Conflict Areas, Priority Rules	-	-	-	-
OUTPUTS	***Delay***	Per movement	Per lane	Per movement	Per lane	Per lane
	Queuing	Average/ Maximum queue per movement	95th percentile queue per lane	Average/ 95th percentile queue per movement	95th percentile queue per lane	Average/ Maximum/95th percentile queue per movement

(Continued on page 9)

The peak hour turning movement counts analyzed are shown in **Table 2**.

Table 2: Input Volumes for AM and PM Peak

Peak Hour	NBL	NBT	NBR	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBL	WBT	WBR
AM	20	37	18	14	0	307	55	308	324	14	20	463	29
PM	20	0	4	24	0	207	41	133	348	46	17	429	27

Results

The following tables show the measures of effectiveness using the same input volumes for the various tools. **Table 3** shows the delay and Level of Service (LOS) and **Table 4** shows the queue lengths.

Table 3: Delay and LOS Results Using Various Tools

Program	Peak Hour	Intersection Delay*/LOS		Approach Delay*/LOS							
				EB		WB		NB		SB	
Vissim	AM	12	B	9	A	17	C	12	B	8	A
	PM	5	A	5	A	4	A	4	A	8	A
ARCADY	AM	11	B	11	B	13	B	6	A	9	A
	PM	7	A	7	A	7	A	4	A	7	A
HCS 7	AM	15	C	11	B	22	C	9	A	15	C
	PM	10	A	9	A	11	B	6	A	11	B
Synchro (HCM 6th Edition)	AM	19	C	12	B	31	D	11	B	19	C
	PM	13	B	10	A	13	B	6	A	19	C
SimTraffic	AM	7	A	7	A	34	D	7	A	6	A
	PM	6	A	5	A	7	A	4	A	6	A

*Delay in seconds per vehicle

Table 4: Queue Results Using Various Tools

Program	Peak Hour	Queue Length (ft)							
		EB		WB		NB		SB	
		Avg	Max*	Avg	Max*	Avg	Max*	Avg	Max*
Vissim	AM	50	800	75	650	25	125	25	300
	PM	25	400	25	325	25	50	25	250
ARCADY	AM	75	225	75	200	25	25	25	100
	PM	50	125	50	100	0	25	25	100
HCS 7	AM	-	150	-	200	-	25	-	100
	PM	-	100	-	100	-	25	-	50
Synchro (HCM 6th Edition)	AM	-	100	-	125	-	0	-	75
	PM	-	100	-	100	-	0	-	125
SimTraffic	AM	50	250	200	500	25	75	50	125
	PM	25	125	50	175	25	50	50	175

*Larger of the reported max or 95th percentile queue

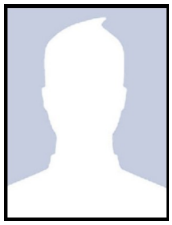
(Continued on page 10)

Conclusions

The intersection LOS for the AM peak hour varied from A to C, with SimTraffic showing LOS A and HCS7 showing LOS C. Vissim and ARCADY showed LOS B. The intersection LOS for PM peak hour was A for all tools, except when using Synchro which showed LOS B. The main notable difference in operations between the programs analyzed was the maximum queue length reported. As shown in **Table 4**, the maximum queue length in Vissim was shown to be much longer than any of the other programs, however the average queues were generally close between the programs.

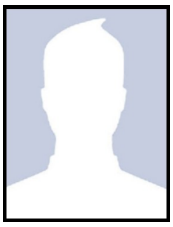
The tools each have varying capabilities, and some are able to handle unique situations better than others. Vissim and ARCADY have the greatest capability in terms of customization and simulation capabilities. The other tools are far less input intensive but can reach similar conclusions assuming under-capacity operations. Ultimately each of these programs may be best suited for particular applications, and the selection should be based on the particular needs of the analysis being performed.

TECHNICAL COMMITTEE UPDATE



Geometric Design Technical Committee
Committee Chair: **Position Open**
Recent Agenda Items: No recent meetings
Future Agenda Items: TBD. Currently in need of a Chari and Co-Chair
Next Meeting: TBD

Intersection Traffic Control Technical Committee
Committee Chair: **Cade Botten -** Cade.Botten@hennepin.us
Recent Agenda Items: Updated MnDOT signal pole design standards, roundabout design, Divergent Diamond Interchanges, asset management.
Future Agenda Items: FYA delay, POOFYA logic, FYA with ped protect, leading vs lagging left turns, permissive left turns.
Next Meeting: 8:00 AM - 10:00 AM, Virtual Meeting, Thursday May 20th.



Emerging Technologies in Transportation Technical Committee
Committee Chair: **Open Position (see page 6)**
Recent Agenda Items: No recent meetings
Future Agenda Items: Committee rebrand
Next Meeting: TBD

Complete Streets and Safety Committee
Committee Chair: **Hannah Johnson -** hjohnson@nc-ite.org
Recent Agenda Items: No recent meetings
Future Agenda Items: Setting plans for 2021, Chair and Co-Chair for 2021
Next Meeting: TBD

Planning Methods and Applications Technical Committee
Committee Chair: **Krista Palmer** - kpalmer@srfconsulting.com
Recent Agendas Items: Discussion on COVID impacts to regional travel demand/telecommuting.
Future Agendas Items: How to model increased telecommuting in regional travel demand models/ COVID impacts. Transit model updates. Updated regional network. MnDOT model output checks for reasonableness and post processing adjustments.
Next Meeting: TBD

Traffic Operation and Maintenance Discussion Group
Committee Chair: **Adam Bruening** - adam.bruening@co.washington.mn.us
Recent Agenda Items: No recent meetings
Future Agenda Items: TBD
Next Meeting: TBD (First Wednesday of each month)

Simulation and Capacity Analysis Technical Committee
Committee Chair: **Sudheer Dhulipala -** SDhulipala@wsbeng.com
Recent Agenda Items: Presentation by Fabio Sasahara (McTrans Center) to present on HCM 6.1.
Future Agenda Items: Presentation by Joe DeVore PE, PTOE, RSP2 on Iteris ClearGuide.
Next Meeting: 4:00 pm, Virtual Meeting , Wednesday May 26th

Strategic Highway Safety Plan - Speed

Kate Miner, PE | Stonebrooke

In each issue, the INCITER features articles coordinated by NCITE's advertisers.
This article is a contribution from **Stonebrooke.**

Risk to Pedestrians Increases as Driver Speed Increases.
Source: Vision Zero Minneapolis, MN Brian T Tefft (2013)

The Strategic Highway Safety Plan (SHSP) is a plan to reduce fatal and serious crashes on Minnesota roadways. The long-term goal is to eliminate deaths and serious injuries on Minnesota roadways completely. The SHSP includes 20 focus areas and the Core Focus Areas include inattentive drivers, impaired roadway users, intersections, speed, lane departure, and unbelted vehicle occupants. Between 2015-2019, 21% of all fatal and serious injury crashes in Minnesota involved speed. This core focus area is also seeing an upward trend over the past years.

Currently in Minnesota, speed limits are set by State Statute. If the posted speed limit varies from the State Statute, a speed study is required. Agencies routinely get requests to conduct a speed zone study to lower roadway speeds. In 2019, the State Statute changed to give Minnesota cities the authority to set speed limits on the roadways they own (does not apply to County or State roadways). The new law states that a city must implement changes in a consistent and understandable manner, and develop procedures based on safety, engineering and traffic analysis.

Stonebrooke Engineering is working with the Local Road Research Board, Research Implementation Committee (LRRB, RIC) to complete a project that will help guide Minnesota cities when determining speed limits on municipal roadways. This project will help agencies understand the impacts of lowering the speed limit, while identifying measured benefits. This project will include evaluating past studies, as well as conducting a survey to help understand agency needs and levels of support necessary to implement speed limit changes. The survey will identify specific questions MN agencies have regarding the new statute and provide the answers in an easy to read/search document. This project will also include a best practices response for agency staff to utilize when asked to consider changing speed limits.

(Continued on page 13)

Wrong Way Vehicle Detection & Alerting System (continued from page 12)

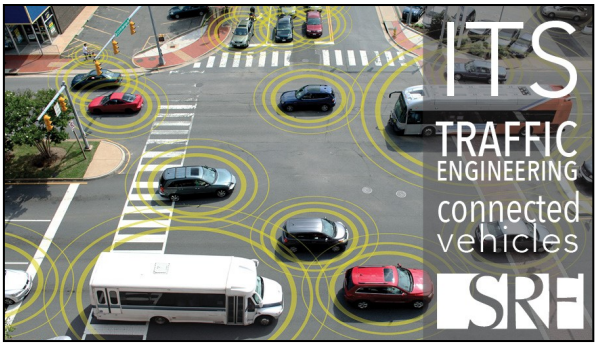
Stonebrooke will also examine FHWA methods to setting speed limits including, Engineering approach, Expert Systems approach, and Safe Systems approach. An emphasis will be put on understanding the methodology and results, as well as the challenges faced by local communities that have successfully established residential speed limits of 25 mph.
Work tasks associated with this effort include:

- Developing and executing a survey for MN Agencies with specific questions geared toward evaluating their understanding regarding the new statute
- Creating a quick reference guide that describes common and best practices for setting speeds on local roads, provides and understanding and explanation of the new state statue.

The guide will include:

- Data on results of previous projects and the safety impacts for the public
- A best practices response to councils to address questions when asked to consider changing speed limits.
- Guidance on the best practices for setting speeds
- Survey results
- Guidance for cities of all sizes on how to develop and implement a citywide speed limit.
- Guidance on how to conduct a corridor specific speed limit study.

Additionally, Stonebrooke will be presenting the findings, guidelines, and documents at Association Conferences, Events, District Meetings, and other transportation educational appropriate events, as determined by the TAP and RIC.



ITE LOL

Source: Dilbert

MEMBERSHIP UPDATE

New Members

Maria Donnelly - HNTB

Chloe Weber - Bolton & Menk

Pramesh Kumar - University of Minnesota

Blake Andert - University of Minnesota

Justin Thornton - University of North Dakota

Moves

Caitlin Wotruba - KLJ, formerly Kimley-Horn

Mark Powers - SRF Consulting, formerly Stantec

Kristin Atkins - SEH Inc., formerly Toole Design

Shauna R. McIntire - Alliant, formerly MnDOT

James William Flickinger - Sambatek , formerly Westwood Professional Services

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If you or a friend has changed jobs or moved, we would like to stay in touch. Members, please update your information by visiting http://www.ite.org/membership/index.asp. To access this area, you will need to know your membership number. Your "username" is your membership number, and your "password" is the first 6 letters of your last name (e.g. Johnson=Johnso). Non-members please contact Jack Olsson via phone (651.393.6158) or email (Jack.Olsson@kimley-horn.com) for assistance. Please provide you name, title, employer, complete street address (including mailstop, if applicable), telephone number, fax number, and email address.

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